TESTIMONY OF

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BEFORE THE

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Chairman Boehlert, Ranking Member Hall, and Members of the Committee, I want to thank you for this opportunity to testify on the President's FY 2003 Budget request for the science and technology programs within the Department of Commerce's National Oceanic and Atmospheric Administration and Technology Administration, which includes the National Institute of Standards and Technology. I am eager to share with you the Department of Commerce's role in implementing the Administration's science and technology budget priorities for the upcoming fiscal year.

September 11th not only forever changed our nation, it immediately posed great challenges for this Administration and the Congress. The President is committed to fighting and winning the war on terrorism and harnessing the resources of the Federal government to protect the lives and safety of all Americans. At the same time, the Administration is committed to revitalizing our economy and returning our nation to economic growth and prosperity.

Secretary Evans and I will make full use of the assets of the Department of Commerce to help provide for the security of our citizens. We also plan to work with other Federal agencies within the Government and the private sector to spur the innovation and entrepreneurship that lead to more high-quality, high-paying jobs, which in turn foster our country's economic security.

Economic growth and global competitiveness depend upon sustained innovation, and innovative capacity, in turn, depends on sustained investment in research and development (R&D). As an engineer by training, I know that the Federal government plays an important role in supporting the fulfillment of our nation's R&D needs -- a role that is reflected in our FY 2003 budget request. As a former CEO, however, I know that R&D under the American system is fundamentally the job of the private sector. Last month, I hosted the first in a series of roundtables sponsored by our Department to bring together Federal officials and corporate R&D leaders to examine how the Federal government can best help the private sector while deploying our own resources most strategically.

Outreach to the scientific community, through initiatives such as our R&D roundtable series, is essential in formulating the Department's science and technology agenda. Secretary Evans and I intend both to listen to the science and technology leaders that drive American innovation and to work with them to ensure that our nation's R&D goals are met.

The Department also maintains an open dialogue with both the White House and our fellow science and technology agencies within the Federal government to make certain U.S. taxpayer dollars are fully optimized and redundant or uncoordinated research efforts can be reduced. For example, at the request of the President, Secretary Evans and Energy Secretary Abraham have been leading a government-wide review of climate change science and technology. They have been conducting a series of interagency meetings, and we are hopeful that a proposal will be forthcoming soon.

The FY 2003 Department of Commerce budget submitted to the Congress not only supports the Administration's homeland defense and economic revitalization priorities, it also continues our commitment to fund the important work that has always been carried out by the Department's National Oceanic and Atmospheric Administration (NOAA), Technology Administration (TA) and the National Institute for Standards and Technology (NIST). Now I would like to describe some of the specific program activities carried out by TA, NIST and NOAA, as well as the President's FY 2003 Budget request and initiatives for these programs.

TECHNOLOGY ADMINISTRATION PROGRAMS

Technology is reshaping our world in once-unimaginable ways, and the pace of change is accelerating. The prosperity of nations and companies will depend, in large measure, on their ability to harness the power of technology and deliver on its promise.

The Federal government has an important role to play in ensuring that the United States and American companies lead the world. This role includes:

- Promoting innovation through leadership and advocating policies that encourage research, development, and commercialization of new technologies (such as nanotechnology and biotechnology), and promoting the adoption of enabling technologies, such as broadband.

- Supporting entrepreneurship by representing the interests of U.S. innovators and entrepreneurs in multinational forums and international partnerships, and through working with states, localities, and federal labs to institute policies that promote technology-led economic development.

- Improving the innovation infrastructure by contributing to the development of national workforce policies that improve the education and training of future scientists and engineers, and by recognizing excellence through the National Medal of Technology program.

- Empowering citizens by working with industry to increase consumer confidence and employ technologies in new ways for greater productivity and higher standards of living, such as in telemedicine and e-government applications.

The Technology Administration is the only Federal agency with the explicit mission to work full-time to maximize technology's contribution to the national economy and -- in so doing -- raise the standard of living for all Americans. This job is tremendously important and it has become even more so since the horrendous events of September 11.

In the aftermath of the terrorist attacks, we must place an even higher premium on invention and innovation. Technology in the pipeline or still on the laboratory bench can help the United States and its allies prevail in the fight against terrorism. It can help to bolster homeland protections and to correct vulnerabilities in critically important infrastructures -- communication, transportation, water supplies, and power plants, to name just a few. As I have already suggested, progress in the development and application of technology is fundamental to economic prosperity. This is why last month I hosted the first in a series of roundtables to bring together Federal officials and corporate R&D leaders to examine how the Federal government can best help the private sector while deploying our own resources most strategically. And, building on a tradition of collaboration with the private sector, TA and its National Institute of Standards and Technology (NIST) are contributing in all these areas.

THE PROGRAMS OF TA'S NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST is a world-class organization that performs world-class research driven by its mission -- developing and promoting measurements, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life. NIST has just begun its second century of service to the Nation. It concluded its first one with achievements that bode well for the Nation and, in particular, for the Nation's technology infrastructure.

In 2001, for the second time in five years, a NIST scientist won the Nobel Prize in Physics, the ultimate recognition in science. This time NIST's Eric Cornell, along with University of Colorado colleague Carl Wieman and MIT colleague, Wolfgang Ketterle, shared the honor for creating an entirely new state of matter, called the Bose-Einstein condensate. This super-cold creation, first accomplished in 1995, launched a new branch of atomic physics and has unlocked a treasure trove of discoveries and emerging technologies.

Importantly, the work of Cornell, Wieman and Ketterle builds on the contributions of NIST's other Nobel Prize winner, Bill Phillips. Phillips perfected methods for trapping and cooling atoms with lasers. This capability is now exploited in NIST's newest atomic clock, which neither gains nor loses more than a fraction of a nanosecond -- that's less than one-billionth of a second -- in 20 years.

This clock, in turn, is central to NIST's time services, which customers use hundreds of millions of times a day. The number of time requests is increasing at a compounded growth rate of nearly nine percent per month.

Time-keeping, with its diverse array of customers in the financial services, aviation, and telecommunications industries, requires increasingly higher degrees of accuracy. So, last year,

NIST scientists demonstrated a new approach to atomic time-keeping, one that has the potential to be up to 1,000 times more accurate than today's best clock.

This is just one example of how NIST continues to improve its capabilities. As in so many other areas of science and technology, NIST is developing the measurement infrastructure that will open the way to breakthrough technologies like quantum computing and nanotechnology. These technological advances will help to secure our nation's economic future.

The Malcolm Baldrige National Quality Program, the Advanced Technology Program, and Manufacturing Extension Partnership Program: In addition to the technical accomplishments of the NIST laboratories, the Nation also is benefitting from NIST's other programs: the Malcolm Baldrige National Quality Program, the Advanced Technology Program, and the Manufacturing Extension Partnership Program.

This past year was an especially notable one for the Baldrige Program. It awarded its first Malcolm Baldrige National Quality Awards in the education category. Two school districts -- Chugach, Alaska, and Pearl River, New York -- and one university -- Stout University in Wisconsin -- accounted for three of the five awards given this year.

These award winners will be excellent role models for 21st century education organizations. We are optimistic that, in the years to come, adoption of the Baldrige criteria for performance excellence will spread across the education sector. As it does, we anticipate that the Program will motivate the same kind of revolution in quality that it helped to launch in U.S. industry. The budget includes $5.8 million for the Baldrige Program.

The Advanced Technology Program (ATP), as this Committee well knows, has been the subject of perennial debate that has hindered its stability and effectiveness. Last summer, Secretary Evans initiated a review of the Program with a view toward resolving this debate. The results of that review are outlined in a report, *The Advanced Technology Program: Reform with a Purpose*, which was issued earlier this month.

Based on the Department's careful review and analysis of ATP, the report highlights important reforms for the Program and more clearly defines its role in the R&D enterprise. Technologies developed through the ATP have significant potential to bring economic growth and benefits to the entire nation. Nevertheless, our review concluded that some reforms are needed to provide ATP with the proper tools and direction it needs in order to be effective in the 21st century. For example, much has changed since the Program's inception over a decade ago, such as the increasingly important role of universities in innovative activity and participation in commercial ventures. Despite this expansion in their R&D role, universities may not, under current law, lead ATP joint ventures or hold rights in the intellectual property that results from ATP-funded research. The Program needs to respond to this and other changes in the research and business environment.

With the implementation of appropriate reforms, including some level of recoupment of the government's investment in profitable ventures, which can be re-invested into the Program, the

stability and effectiveness of the Program, we believe, can be greatly improved. To go along with these recommendations, the Administration proposes a budget of $107.9 million.

The President proposes $12.9 million for the Manufacturing Extension Partnership (MEP) Program. This proposal would return the partnership to its original plan, which called for the phaseout of Federal funds to MEP centers after six years. NIST MEP will continue to focus on providing a central coordination role for the network of centers.

NIST Laboratories: Overall, for the NIST laboratory program, the Administration proposes $396.4 million, an increase of slightly more than $75 million over last year's appropriation. Of this amount, $50 million will be used to complete and equip NIST's state-of-the-art Advanced Measurement Laboratory, now under construction. A facility like no other in the world, the Advanced Measurement Laboratory is due to be completed in late 2003.

This facility -- the "AML" – is tremendously important to the Nation's technology future and to the competitiveness of the industries of the future. Only in the AML's unique, highly controlled environment will NIST be able to develop essential capabilities and tools. High-technology industries need advanced measurement methods and standards to efficiently develop and produce new products and services. The semiconductor, telecommunications, data storage, biotechnology, and other key technology industries already require extremely precise measurements and standards that are approaching atomic scale. Growing demand for these and other exceedingly accurate measurement capabilities can only be met with special equipment in the unique AML environment.

In addition, we are requesting a total of $54.5 million for construction and renovation projects. A significant amount of this construction money will go toward long-overdue improvements at NIST's Boulder, Colorado, laboratories, where most of the buildings are nearly 50 years old. Obsolescence already threatens the ability of Boulder staff to provide services that meet the levels of accuracy required by their industrial customers. The list of improvements to be made is long, but we intend to make a serious start on improving those facilities.

Now, I would like to highlight a few key NIST laboratory initiatives. These illustrate the President's aim to leverage the Nation's technology resources to speed progress on the three security fronts.

Six million dollars will be used to expand operations and strengthen research capabilities at the NIST Center for Neutron Research, the best and most productive facility of its kind in the United States and among the best in the world. As growing numbers of researchers in many fields of science and engineering are discovering, neutrons are incredibly useful probes. Requests for "beam time" at this national user facility greatly exceed the center's existing capacity. Expansion and improvements will benefit investigators in fields ranging from materials science to biology to fuel-cell research.

NIST will expand its program in nanotechnology, the so-called "tiny revolution" in technology,

with a $4 million increase. NIST is already a leader in this exceptionally promising area. Nearly all industrial sectors plan to exploit this emerging technology, and most of these plans call for appropriately scaled measurements and standards, NIST's specialty.

NIST's standards and measurements activities actively support efforts to strengthen homeland security. Currently, NIST is conducting more than 75 projects that support law enforcement, military operations, emergency services, airport and building security, cyber security, and efforts to develop new types of security technologies.

For example, NIST's building and fire experts have just started to initiate a broad public-private partnership effort -- an effort that is informal at this point -- that would determine the probable technical cause of the building collapses in the World Trade Center disaster. NIST will use the knowledge gained from this effort to derive lessons learned, develop and disseminate immediate guidance and tools to assess and reduce vulnerabilities, and produce the technical bases for cost-effective changes to national practices and standards. NIST assisted the U.S. Postal Service and others to ensure that commercial radiation facilities can be used to sanitize mail tainted with anthrax or other contaminants. Further, NIST provided modeling assistance to the Environmental Protection Agency in evaluating the anthrax dispersion in the Hart Senate Office Building, and, as a result of the Patriot Act, NIST is working with the Departments of State and Justice in the development of a new technology standard to confirm identity.

To go along with these current efforts, the Administration is requesting an additional $2 million to fund a portion of the critical and urgent national needs in structural fire protection and operational guidance for first responders. Also, as the Congress well knows, the need to strengthen our public health system is critically important in the light of the bioterrorism threat. Therefore we propose a $3 million increase for NIST to provide advanced measurements and standards that will improve the quality of our health care infrastructure.

Examples of how NIST carries out its mission and delivers benefits to industry and the entire nation are plentiful. They range from standards used to ensure the effectiveness of diagnostic mammograms to measurement tools that are helping the electronics industry progress in its continuous pursuit of faster, smaller, and ever more capable integrated circuits. NIST and its dedicated staff provide the Nation with a highly leveraged payoff that will help secure our future.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) PROGRAMS

NOAA plays a vital role in the everyday lives of our citizens through numerous contributions to the Nation's economy and environmental health. The FY 2003 President's Budget request for NOAA is $ 3.3 billion in total budget authority. This represents a net decrease of $45 million from the FY 2002 level. When the amount of the retirement costs that were formerly shown in the Office of Personnel Management's budget is removed, the net programmatic decrease is $136 million. The Department of Commerce proposes increased spending in the following critical areas of interest to this Committee: Improving Extreme Weather Warnings and Forecasts ($84.3 million increase); Climate Services ($36.2 million increase); Energy ($8.7 million increase); and

Homeland Security ($23.1 million increase). I would like to highlight some of the major components of these priority funding areas. These particular programs are carried out by NOAA's National Weather Service (NWS), National Environmental Satellite, Data, and Information Service (NESDIS), and Office of Oceanic and Atmospheric Research (OAR).

Homeland Security and Related Activities ($23.1 Million Increase): On September 11, 2001, the Nation experienced an unprecedented attack on the World Trade Center and the Pentagon. NOAA immediately implemented its agency-wide Incident Response Plan and was able to rapidly deploy critical assets, capabilities and expertise to support the response and recovery efforts. NOAA personnel in weather offices, satellite and remote sensing teams, hazardous materials units, marine transportation and geodesy offices, and fisheries enforcement teams provided a wide range of products and services.

The September 11 attacks fundamentally altered NOAA's incident response planning. NOAA's Homeland Security efforts are focused on enhancing its response capabilities and improving internal safety and preparedness. These activities are dedicated to advancing the coordinated efforts of the Department of Commerce and the Office of Homeland Security and to assisting NOAA's many Federal, state and local partners. Highlights of this initiative include:

- **NESDIS Single Point of Failure:** The Department requests a total of $2.8 million to provide backup capability for all critical satellite products and services. This effort would provide critical operational satellite products and services during a catastrophic outage.

- **Satellite Facilities Security:** The Department requests a total of $2.3 million, an increase of $0.3 million, to enhance security at the Fairbanks, Alaska and Wallops, Virginia satellite Command and Data Acquisition ground stations.

- NWS Gateway Critical Infrastructure Protection: The Department requests a total of $3 million for the National Weather Service Telecommunications Gateway Backup (NWSTG). This funding will allow NOAA to establish a NWSTG backup facility. The current NWSTG facility is a single point of failure vulnerable to natural disasters, human error, computer viruses, hacker attacks, and terrorism. If the NWSTG failed, more than 90 percent of weather observations would be lost and no national weather observations, products or prediction models would be sent to external users.

- **Weather & Climate Supercomputing Backup:** The Department requests a total of $7.1 million to implement an operational backup system for the NWS weather and climate supercomputer. The supercomputer runs prediction models and is currently a single point of failure as the entire system is located in a single facility.

Improving Extreme Weather Warnings and Forecasts ($84.3 Million Increase). The continuity of NOAA's satellites and severe weather forecasts is critical to meeting our 21st Century mission. To ensure our success, the FY 2003 President's Budget request includes an increase of
$84.3 million for a total of $766.7 million. I would like to highlight some of the programs that

comprise this initiative.

• **U.S. Weather Research Program (USWRP):** The Department requests an increase of $1 million over the FY 2002 enacted level for a total of $3.8 million to support the transition of research and development into operations in order to reach the USWRP initial goals of improving forecasts of inland heavy precipitation associated with landfalling hurricanes. The increase will be used to improve the forecasts of heavy and, often, flood-producing rains associated with hurricanes and tropical storms as they move inland.

• **Advanced Hydrological Prediction Service (AHPS):** The Department requests an increase of $4.7 million over the FY 2002 enacted level for a total of $6.2 million to accelerate nationwide implementation of improved flood and river forecasts services in the Northeast, Middle Atlantic, and Southeast. As implemented, AHPS will: 1) produce new information with better predictions of river height and flood potential to reduce loss of life and property; 2) deliver high resolution, visually oriented products to provide partners and customers with valuable information for life decisions; 3) refresh aging hydrologic forecasting infrastructure to support rapid infusion of scientific advances; and 4) leverage NOAA's investments in observational systems and atmospheric models to enhance accuracy and resolution of river forecasts.

• **Tornado Severe Storm Research:** The Department requests an increase of $1 million to develop new technologies for forecasting and detecting tornadoes and other forms of severe weather and to disseminate this information to emergency managers, the media, and the general public for appropriate action.

• **Weather & Climate Supercomputing:** The Department requests an increase of $6.2 million over the FY 2002 enacted level for a total of $21.2 million to continue operations and maintenance of the current NWS IBM SP system (Class VIII) and to transition the next generation weather and climate supercomputing system into operation (system to be acquired and installed during FY 2002). The NWS supercomputer is the foundation for all NWS weather and climate forecasts. The increased capability of the supercomputer will improve both local forecasts and climate extreme events such as El Nino and La Nina.

• **National Polar-orbiting Operational Environmental Satellite System (NPOESS):** The Department requests an increase of $79.9 million over the FY 2002 enacted level for a total of $237.3 million for the continuation of the tri-agency NPOESS program that will replace the NOAA POES program after completion of the current NOAA K-N' series of satellites. The NOAA request represents the NOAA share of the converged NOAA/DoD/NASA program. In FY 2003, funds will be required to continue the development and production of the NPOESS instruments. The continued development of these instruments is critical for their timely and cost effective delivery to replace both the Defense Meteorological Satellite Program (DMSP) and the NOAA POES spacecraft when needed. The first NPOESS satellite will be available for launch in FY 2008 when the last of the POES satellites is launched.

• **NOAA Polar K-N':** The Department requests a total of $122.9 million for the NOAA Polar K-N' to fund the continuation of the production and launch of this series of satellites. NOAA will use these funds to continue the procurement of the NOAA M through N' satellites, instruments, launch services, and ground systems. Funding would also upgrade deteriorating ground systems to allow for continued operations of the Polar K-N' series through the end of its lifetime. The Polar K-N program is completing major procurement items and therefore does not need to continue the funding levels of previous years.

• **Geostationary Operational Environmental Satellite (GOES):** The Department requests a total of $227.4 million to support continued post launch requirements for GOES I-M. This decrease represents a program change resulting from the successful launch of GOES M, and the continued success of the GOES I-M series.

• **Joint Center for Data Assimilation:** The Department requests an increase of $2.6 million over the FY 2002 enacted level for a total of $3.4 million for the Joint Center for Satellite Data Assimilation. NOAA and NASA are partners in this national effort to more fully realize the potential of the vast quantities of new satellite data that are becoming available. The Center will reduce the average time for implementation of data from new satellite technology from two years to one year, resulting in improved weather forecasts and warnings.

Climate Services ($36.2 Million Increase): From the storms of next week to the drought of next season to the potential human-induced climate change over the coming century, issues of climate variability and change will continue to be a major issue for the Nation. The Department requests an increase of $36.2 million to improve climate services. The majority of this is for the Climate Change Research Initiative (CCRI). Among the components of the CCRI are commitments to study areas of scientific uncertainty and to identify priority areas where investments can make a difference. In line with recent recommendations by the National Academy of Sciences, the CCRI promotes a vision focused on the effective use of scientific knowledge in policy and management decisions, and continual evaluation of management strategies and choices. The sections below describe NOAA's request for initial investments to address key priorities of the CCRI. The balance of the Climate Services increase would fund climate research in the Arctic ($2 million), climate monitoring and ocean observations ($5.4 million), use of UNOLS ships ($2.5 million), and archiving access and assessment of climate data ($8.3 million).

• **Climate Modeling Center:** The Department requests $5 million to establish a climate modeling center within the Geophysical Fluid Dynamics Laboratory (GFDL) at Princeton, New Jersey, which will focus on model product generation for research, assessment and policy applications as its principal activity. GFDL has played a central role in climate research, pioneering stratospheric modeling, seasonal forecasting, ocean modeling and data assimilation, and hurricane modeling. This core research capability will be enhanced to enable product generation and policy-related research.

• **Global Climate Atmospheric Observing System:** The Department requests $4 million

to work with other developed countries to reestablish the benchmark upper-air network, emphasizing data sparse areas, and place new Global Atmosphere Watch stations in priority sites to measure pollutant emissions, aerosols, and ozone, in specific regions.

• **Global Ocean Observing System:** The Department requests $ 4 million to work towards the establishment of an ocean observing system that can accurately document climate scale changes in ocean heat, carbon, and sea level changes.

• **Aerosols-Climate Interactions:** The Department requests $2 million to contribute to the interagency National Aerosol-Climate Interactions Program (joint with NASA, DOE, NSF) currently under development. Specifically, NOAA will establish new and augment existing in-situ monitoring sites and conduct focused field campaigns to establish aerosol chemical and radiative properties. In collaboration with the NPOESS Integrated Program Office, NOAA will advance the development of the NPOESS planned satellite measurement capabilities.

• **Carbon Monitoring:** The Department requests $2 million to augment carbon monitoring capabilities in North America as well as observations of globally relevant parameters in key under-sampled oceanic and continental regions around the globe, selected to reduce high uncertainty in current flux estimates.

• **Regional Integrated Science Assessments Program:** The Department requests $1 million for the Regional Integrated Science Assessments Program (RISA). Working with the National Science Foundation (NSF), NOAA will augment its research capability in assessing climate change impacts vulnerability by utilizing the research on "decision making in the face of uncertainties" in the framework of the RISA program.

Energy Initiative ($8.7 Million Increase): As part of an increase for an Energy Initiative, the Department requests $6.1 million to implement a pilot program that will provide more accurate temperature and precipitation forecasts, and additional river forecast products to help the energy industry improve electrical load forecasting and hydropower facility management. Based on industry estimates, this investment may result in savings of $10 to $30 million annually in the pilot region after the second year of the demonstration. Expanding the pilot nation-wide could generate savings of over $1 billion per year.

Another part of the Energy Initiative is the Department's request of $550,000 for energy management. The requested funds will be used to reduce NOAA's facility operating costs through actively pursuing energy commodities at competitive prices, identifying and implementing energy savings opportunities and applying renewable energy technologies and sustainable designs at NOAA-managed facilities. Many of the equipment retrofits that are a part of energy management have enabled facilities to recover their costs in less than five years.

Ocean Exploration: The Department requests a total of $14.2 million for ocean exploration. This program seeks to increase our national understanding of ocean systems and processes through partnerships in nine major voyages of discovery in FY 2003. It uses ten percent of all

funds for education and outreach to teach America's school children and stimulate their interest in ocean science.

National Sea Grant College Program: The Administration proposes to transfer funding for the Sea Grant program to the National Science Foundation (NSF). The Administration believes that there are advantages to locating such scientific research in the NSF, which has an outstanding record in administering merit-based research and education.

CONCLUSION

This completes my statement. The Department has many exciting technology initiatives. I look forward to working with you as these proposals move through the legislative process. I would be pleased to answer any questions you may have.